Predicting sustainable work behavior: Evidence from China

Kim Sundtoft Hald (ksh.om@cbs.dk)
Copenhagen Business School, Department of Operations Management

Abstract

Sustainable work behavior is an important issue for operations managers – it has implications for most outcomes of OM. This research explores the antecedents of sustainable work behavior. It revisits and extends the sociotechnical model developed by Brown et al. (2000) on predicting safe behavior. Employee characteristics and general attitudes towards safety and work condition are included in the extended model. A survey was handed out to 654 employees in Chinese factories. This research contributes by demonstrating how employee- characteristics and general attitudes towards safety and work condition influence their sustainable work behavior. A new definition of sustainable work behavior is proposed.

Key words: Sustainable operations management; Workplace safety; Employee well-being

Introduction

The pressure to address environmental and/or social issues in the supply chain is real, but implementing improvements in practice have proven to be dependent on a multitude of supply chain actors' experiences and attitudes (Pagell and Gobeli, 2009). From a supply managers perspective improving sustainability performance upstream implies a chain of influence comprising at least three main levels.

At the first level, a buying firm seeks to influence a supplier becoming more sustainable. This is a relation that often is conceptualized and discussed as an issue of governance (Abbasi and Nilsson, 2012). Here the buyer enforces a set of rules and regulations in the form of codes of conduct or social and environmental audits upon the supplier. Actors are portrayed as firms, or by their ownership.

At the second level, research suggests that when it comes to being more sustainable there can be large gaps between what the supplier desires and its actual ability to implement these desires in own organization through its middle management (Pagell and Gobeli, 2009).

At the third level, employees´ are the last in a chain of actors that can influence "sustainability in the making". While most social sustainability aspects are designed to protect factory employees, it is often ignored that employees themselves have a decisive role in their successful implementation. Employees´ can either help enforce social and environmental rules and regulations, or they can work directly against them in order to obtain other more valued benefits, such as increased hourly salary or improvements in life time income. Specifically, safety rules and regulations can be seen as hindering the firm attain economic sustainability or prevent the employee from becoming more efficient (Brown et al., 2000).

Employee attitudes and behaviors towards social and environmental sustainability thus seem highly relevant in our efforts getting a more fully understanding of the obstacles met implementing sustainable supply chains. To date we only know little about these attitudes and behaviors and how they may influence the actual implementation of improve safety and work condition (WC) performance. This research begins to address this gap by providing answers to the following research questions.

1. How do employee characteristics relate to the formation of their sustainable work behavior?
2. How do employee general attitudes towards improved safety and work conditions relate to their sustainable work behavior?

Answers to the first question will provide insight into if and how employee characteristics such as age, gender, social background, seniority, knowledge and education influence their attitudes, perceptions, commitment and actual reported safety and WC related behavior. Answers to the second question will help determine whether and how positive or negative attitudes towards safety and WC actually have an effect on employees´ commitment to improve WC or abide to safety procedures and engage in sustainable work behavior.

Sustainable work behavior

A distinction is made between workplace safety and work conditions, but together they constitute the foundation for a new definition of sustainable work behavior. Workplace safety or operational safety is defined as the discipline concerned with the study of the antecedents of safety performance in operations, and safety performance is the extent to which companies are able to prevent accidents and errors from happening (de Koster et al., 2011). Safety at work has been explored extensively in the safety management (Prussia, et al, 2003; Zohar, 2010), and the organizational behavioral literature (Dunbar, 1975; Griffin and Neal, 2000). In the operations management literature the focus and attention on safety issues has been slow (Brown, 1996), but some seminal contributions have emerged (Ansari and Modarress, 1997; Brown, 2000; Das et al., 2008; de Koster et al., 2011; McFadden and Hosmane, 2001; McFadden et al., 2009; Tucker, 2004; Wolf, 2001). What are the antecedents promoting safe behavior? How can safety performance be increased by gaining knowledge of and by managing the factors promoting safe behavior? What are the links between safe behavior and other key performance dimensions such as quality, flexibility and productivity within any operations (Das et al., 2008). These are all fundamental questions that must be addressed to gain a deeper understanding of the implication of safety at work and safety performance in operations management. The perspective adopted in this research is a blue collar worker perspective. The main interest lies in how the workers themselves through their background characteristics and their general attitudes may influence both safety and work conditions. This research defines sustainable work behavior as the situation where factory employees´ are committed to abide to or improve their conditions. In this situation we can observe high levels of safety efficacy and work condition efficacy as well as actual reported safe behavior.

A sociotechnical model of sustainable work behavior

To give structure to the analysis and to address the two research questions inspiration where found in the sociotechnical model developed by Brown et al. (2000). A sociotechnical model recognizes the interaction of people and technology in workplaces (Trist and Bamforth, 1951). In the context explored here adopting a sociotechnical lens implies a view that sees safety and WC performance outcomes as constructed by a

complex interaction of the infrastructure, rules, regulations and managerial actions of the factory, and the employees´ sustainable work behavioral factors. This fits well with the stated research questions.

The model developed by Brown et al. (2000) specifically addresses issues of safe employee behavior in the US steel industry. It explores the relationship between six variables: Safety Hazards; Perceived Safety Climate; Pressure; Cavalier Attitude towards Safety Risk; Safety Efficacy and Safe Workplace Behavior (p. 449).

This research adopts the model developed by Brown et al. (2000) as the core of the new extended model. All the variables and measures included in the old model are left unchanged. This enables us to test the robustness of the relationship between the variables in a new cultural and social context, namely in China.

However in order to enable us to explore the two research questions the model is extended in two ways. First, and in order to explore the influence of employee characteristics and sustainable work behavior, background variables such as age, gender, social background, seniority, knowledge and education are included. Second, and in order to explore the potential for a more general model of "sustainable work behavior" variables of WC attitudes are included in the model (figure 1). The point of departure is that behaviors in regards to safety and WC both are connected to issues of social sustainability, and that they are expected to be highly correlated. This research thus expects that factory workers that acts sustainable viable in respects to personal safety will behave in fairly the same way in regards to work condition issues.

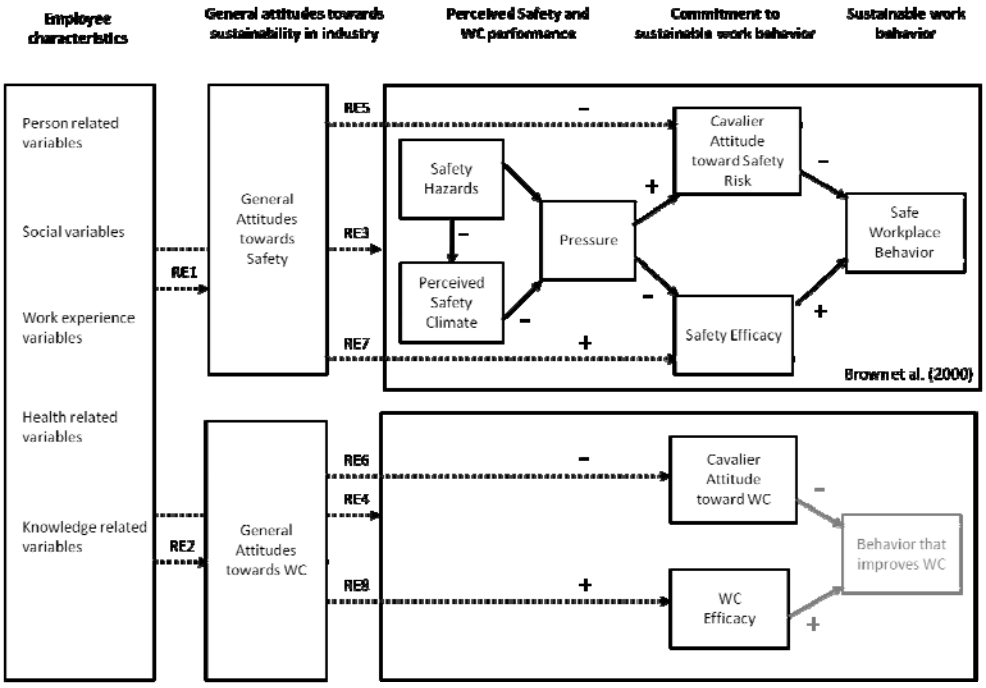

Figure 1 – Preliminary sociotechnical model predicting sustainable work behavior

Relationships in the model

Fig. 1 illustrates the hypotheses about the relationships among the constructs selected for this study. Using the same approach as Brown et al. (2000) these predictions were drawn from the literature and from interviews in the involved firms and manufacturing plants. Predictions inside the Brown et al. (2000) box, all marked with solid lines, are drawn directly from the previous work. The initial expectation is that these relations do

not change even if we move to a different cultural and social context. The extended model includes eight additional main relationships, marked RE1-RE8.

Relationships in the Brown et al. (2000) model

Safety hazards are defined as tangible factors in the work environment that may pose risks for possible injuries or ailments. The assumption is that when employees perceives high levels of safety hazards this sends a signal that the company carries a low commitment to health and safety, and therefore impact perceived safety climate in a negative way. Another effect of higher levels of perceived safety hazards that are suggested is its impact on perceived pressure. *"If employees believe that managers do not care enough to remove hazards, it communicates to employees that the organization has other priorities"* (Brown et al., 2000, p. 450).

Safety climate is defined as employees´ moral perceptions of the role of safety within the organization. It is predicted that if employees perceived the system safety moral as low, they will consider this as *"an additional factor that could increase employees´ perceptions that there are pressure to take safety shortcuts"* (Brown et al. 2000, p. 450).

Cavalier attitudes towards safety risk are defined as an employees' willingness to take safety related risks and to rationalize risk-taking behavior. It is predicted that when employees perceive organizational pressure as high they will value expediency over safety and this will increase the likelihood that they will assume a more cavalier attitude. Furthermore, if an employee holds a cavalier attitude, he or she will be less likely to engage in safe behaviors (Brown et al., 2000, p. 450).

Safety-efficacy is defined as an employee´s confidence that he or she has the skill to work safely in the context of a specific environment. It is expected that increased levels of pressure to value expediency undermine an employee's safety-efficacy, and that this is caused by perceived time pressure leading to the perceived inability to remove hazards and the perception that safety procedures may slow down work efficiency. Furthermore, it is predicted that higher levels of employee confidence in their abilities to work safely would influence the extent to which they actually do so.

Consequences of employee characteristics

Indicated by the relationships R1 to R4 in the model (Fig.1) this research propose that employee characteristics may impact attitudes, perceptions and actual reported sustainable work behavior. First it is suggested that the general attitudes towards safety and WC held by the individuals are affected by employee characteristics (R1&R2). Second, it is suggested that theses employee characteristics might also affect all or some of the variables in the original Brown et al. model (R3) and finally that they may affect the new variables "cavalier attitudes towards WC" and "WC efficacy" (R4).

Five main blocks of variables constitute the employee characteristics. First, the model includes person related variables (age, gender, marital status, child/childless). Age and gender have been included in previous studies exploring employee perceptions of health and safety attitudes (Quartey and Puplampu, 2012). Based on interviews with the involved firms, the marital status and child/childless sub-indicators were included since it was expected that these variables would affect the risk willingness of employees. Second, the model included variables designed to capture some of the complexity involved in the social background of employees (home province, occupation of father, occupation of mother, education of employee). From motivation theory (Maslow, 1943) it was the initial assumption that employees coming from social backgrounds with lower income and less education would hold attitudes and perceptions more hostile towards sustainable work behavior and would be more incline to

rationalize risk-taking behavior and hold cavalier attitudes towards WC. Third, a set of work experience related variables were included (seniority in factory, seniority outside the factory, experience in factories owned by western firms). It was the initial assumption that seniority was linked to learning and cultural adaptation and would affect attitudes and perceptions toward sustainable work behaviour. Specifically, it was expected that internal seniority could be linked to loyalty towards an environment less sustainable and that external seniority could be linked to increased outlook and higher levels of positive attitudes towards sustainable work behaviour. Employee experience with work related health problems or accidents were included as the fourth characterising variable. It was speculated; that this variable specifically would relate strongly towards the safety aspects. The final group of variables included to describe the involved factory workers was their broader strategic knowledge of the factory and firm in which their worked (knowledge of customers, products, objectives and organization).

Consequences of employees' general attitudes towards sustainability

Indicated by the relationships R5 to R8 in the model (Fig. 1) this research propose that employees' general attitudes towards safety and WC may impact their own individual willingness to take risk related to safety and to WC (R5&R6). Cheyne et al. (1998) maintained that safety attitudes remain the most pivotal factor in explaining safe activity. The model also suggests that employees' general attitudes towards safety and WC may influence their willingness to commit to the removal of collective and individual safety or WC related issues (R7&R8). Thus it was expected that more positive attitudes to safety and WC in general would have two effects. It would decrease the likelihood that the employee would assume a more cavalier attitude and it would increase people's confidence in their abilities to work safely (i.e, safety-efficacy) and to improve WC or seek to work in other environments with better WC (i.e. WC-efficacy).

Research method

A survey was handed out to 654 factory workers in eight different factories owned by eight different firms in China. The firms all had Chinese or Hong Kong Chinese ownership. The factories all delivered products to the same buying firm and represented a fairly homogeneous group of firms. Although the sizes of the eight supplying firms varied, the buying firm in all cases only represented a very small portion of their total turnover. Thus potential issues of response bias caused by dependence were avoided. In each factory a random sample of employees were selected. Sample sizes across factories in the final sample varied from 66 to 100 respondents, with a standard deviation of 11.6.

The surveys were distributed inside regular working hours and not during a break. The selected factory workers were instructed as to the purpose and procedure of filling it out. Workers were ensured individual anonymity in all aspect. In order to avoid response bias caused by fear for work related punishment management were not present or engaged in the process when their workers filled out the questionnaire. This procedure resulted in an overall response rate near 100 percent. All surveys were retrieved, but it was later decided not to include responses from one of the factories due to procedural problems. This resulted in a sample of 611 filled out or partly filled out questionnaires. Missed values were treated by excluding cases pairwise, which still made partly filled out questionnaires valuable to the analysis. A total of 165 questions were asked and 611 filled out questionnaires retrieved, making it a potential of 100.815 data points. 93.535 data points were returned, corresponding to an overall average response rate on the individual question of 93%. Response rated on the specific questions ranged from 62.4% to 99.5%, which were perceived as highly satisfactory.

Non-response bias was assessed by examining the difference between respondents and non-respondents on the variables of interest (Forza, 2002). No significant differences were found in any of the comparisons indicating the absence of non-response bias.

Variable measurement

The variables included in the Brown et al. (2000) model were measured using the exact same instruments and measures as in the original work.

The variables included in the employee characteristics section were measured in the following way. Employee age were measured using a nine point interval scale that later was converted to a two group scale, with employees over and under the age of 25 years. Additional variables in the person related category (gender, marital status, child/childless) were all measured as straight forward two group categories. In the social variables category the home province of the employee was requested and subsequently sorted based on the level of average BNP. Finally it was split in two groups (low income provinces and high income provinces) in order to enable a subsequent T-test. The occupation of father and mother was measured on a five category scale (dead, unemployed, farmer, factory worker, business man, public servant and other professions). 86% of the responses indicated either farmer or factory worker, and in order to enable tests for statistical significance, the scale was converted in to a two group scale. In a similar way, education of employee was initially measured on a five point scale that later was converted into two major categories, “public school or no-education” or “high school or higher levels of education”. In the work experience section, the variables on internal- and external seniority were initially measured on five point scales. In order to enable a valid independent-samples t-test both were converted to two group measures. Employees with internal seniority under one year (52%) and over one year (48%), and employees with external seniority under on year (44%) and over one year (56%). The variable “Experience in factories owned by western firms” was simply measured as a yes or no. Finally two multi variable measures were included in the employee characteristics dimension. The variable “employee experience with health” and ““employee knowledge of firm” both used a four item instrument, each measured on a seven point Likert scale with anchors of 1 never/strongly disagree and 7 very often/strongly agree.

The two main variables designed to measure the safety and the WC attitude aspects were measured using two new instruments. General attitudes towards safety were measured using a two item instrument. Questions were measured on a seven point Liker scale and were phrased as “In general safety procedures are necessary” and “Safety procedures must be abided even if the job can be done more efficient without them”. General attitudes towards WC were measured using a four item instrument.

Finally, “WC efficacy” and “cavalier attitudes towards WC” are two new variables proposed in this research, and they are equivalents to “safety efficacy” and “cavalier attitudes towards safety risk”. No prior measures were found in the literature. The two new variables and their definitions were discussed with the involved firms, and based on these interviews the following measures were condensed. WC efficacy was measured using three variables, one related to activities that benefitted the co-workers and the WC in the factory as a whole (social dimension). The two additional variables were designed to address tradeoffs or investments the individual employee had to make in order to demonstrate commitment (i.e. lower salary in better WC environments and pre-contractual investigations of WC in factory before signing the contract).

Results

Descriptive statistics

Table 1 shows the descriptive statistics for all the variables measured using multi-item scales. Most of the Cronbach (1951) alpha coefficients exceeded the 0.70 threshold considered acceptable for internal scale reliability (Nunnally, 1978, p. 245).

Table 1 – Descriptive statistics

Variables	Mean	SD	Minimum actual/ (theoretical)	Maximum actual/ (theoretical)	Cronbach's Alfa
Employees knowledge of firm	19.95	6.291	4(4)	28(28)	0.839
Employees experience with health	7.50	3.892	4/(4)	28(28)	0.680
General attitudes towards WC	22.95	4.796	4(4)	28(28)	0.649
General attitudes towards safety	11.90	3.033	2(2)	14(14)	0.487
Supervisory safety climate	23.87	8.532	5(5)	35(35)	0.875
Managerial safety climate	20.62	5.908	4(4)	28(28)	0.836
Pressure	9.07	5.294	3(3)	21(21)	0.730
Cavalier attitudes	6.66	4.519	3(3)	21(21)	0.770
Safety efficacy	14.38	4.821	3(3)	21(21)	0.852
Safety Hazards	247.82	99.223	80(80)	560(560)	0.975
Safe Behavior	161.60	36.662	0(0)	200(200)	0.908
WC efficacy	13.63	3.725	3(3)	21(21)	0.637

The association between employee characteristics and sustainable work behavior

In order to test the relationship between employee characteristics and sustainable work behavior, a combination of independent samples t-tests and multiple regression analysis where used. Table 2 shows the results. An "X" in the table marks if the t-test found a significant relationship. Especially the person related variables and the variable indicating if the employee had knowledge of the firm, its customer, products, objectives and organization were found to be strong independent variables with a potential to predict many aspects of sustainable work behavior. Results also indicated that cavalier attitudes towards safety risk were related to many variables in the employee characteristics dimension. Cavalier attitudes towards risk were thus found to be especially strongly formed by person related variables and only to a lesser extent by managerial or organizational variables.

Table 2 – Employee characteristics as predictor of sustainable work behavior

	Age	Gender	Marrial status	Child/ Childless	Home province	Occupation father	Occupation mother	Education person	Seniority in factory	Seniority outside the factory	Experience from western owned firms	Employees experience with health	Employees knowledge of firm
General attitudes towards WC				X		X	X				X		0.41***
General attitudes towards SAFETY						X	X					-0.12*	0.29***
Safe Behavior	X	X	X	X									0.17**
Cavalier attitudes towards safety risk	X	X	X	X	X	X			X				-0.19**
Safety efficacy			X										0.31***
Pressure			X	X	X								
Safety hazards	X		X	X									
Safety climate (Supervisor)		X		X		X	X					-0.20**	0.14*
Safety climate (manag.)	X		X	X								-0.17**	0.31***
Cavalier attitudes towards WC									X				
WC efficacy (social)	X		X	X						X			0.32***
WC efficacy (salary)		X											0.22***
WC efficacy (contract)	X											-0.17**	0.13*

Relationships in the Brown et al. (2000) model

Table 3 shows the results of the multiple regression analysis. It reveals that most of the hypotheses from the original sociotechnical model were confirmed in this new cultural and social setting. Specifically we can say that four of the relationships were confirmed, two were indicated to be in the same direction, but were non-significant. One relationship however, the one between Safety Hazards and Supervisory Safety Climate was significant but in contrast to expectations a positive relationship was found.

Table 3 – Path coefficients in the original model

Pathways	Coefficients	P-value
Cavalier Attitudes ----> Safe Behavior	-0,26	0,00
Safety Efficacy ----> Safe Behavior	0,28	0,00
Pressure ----> Cavalier Attitude	0,48	0,00
Pressure ----> Safety Efficacy	-0,02	0.67NS
Safety Hazards ----> Pressure	0,33	0,00
Supervisory Safety Climate ----> Pressure	-0,02	0.71NS
Managerial Safety Climate ----> Pressure	-0,05	0.38NS
Safety Hazards ----> Supervisory Safety Climate	0,21	0,00
Safety Hazards ----> Managerial Safety Climate	0,02	0.66NS

The association between employees' general attitudes towards sustainability and their commitment to sustainable work behavior

The association between employees' general attitudes towards safety and WC, and their commitment to sustainable work behavior was assessed using multiple regression analysis with the results presented in Table 4. All hypotheses in this section of the extended model were confirmed.

Table 4 – Path coefficients in the extended model

Pathways	Coefficients	P-value
General attitudes towards safety ----> Cavalier Attitude	-0,23	0,00
General attitudes towards safety ----> Safety Efficacy	0,10	0,02
General attitudes towards WC ----> WC Efficacy	0,39	0,00
General attitudes towards WC ----> WC Efficacy Own - lower pay check	0,28	0,00
General attitudes towards WC ----> WC Efficacy Own – pre contractual behavior	0,13	0,01
General attitudes towards WC ----> Cavalier Attitudes towards WC	-0,14	0,003

Conclusion

Discussion and implications

The study had to objectives. The first objective was to examine the association between employee characteristics and the variables involved in the formation of their sustainable work behavior. Specifically, the study examined the association between 13 variables describing different aspects of employee background and experience, and their association with 13 variables describing different aspects of sustainable work behavior. Thus a total of 169 variable associations were examined. 52 of the associations corresponding to nearly 31% were found to be significant. This result indicated that the age, gender, marital status, the child/childless distinction, social background, prior work experience, work related health issues and knowledge about the firm, all seem to have some effect on the likelihood that a Chinese factory worker will engage in sustainable work behavior. Specifically the person related variables were found to be dominant predictors. These variables alone accounted for 50% of the significant predictors. Another very dominant predictor was employees' knowledge of the firm. Here findings suggest that employees with more knowledge of the firm, its customer, productions, objectives and organization will demonstrate higher levels of sustainable work behavior on almost all dimensions, as compared to their ignorant colleagues. This result may be

an indicator that involvement, produces understanding that in turn produces more conscious workers. Variables describing social background were found to be moderate predictors, whereas variable related to prior work experience were found to be weak predictors of sustainable work behavior. These results are relevant for practitioners. They seem to suggest that factory owners and managers can influence their factories ability to conform to their customers' demands for more sustainable work behavior in the factories by selecting employees with specific profiles. Taking the influence of the knowledge variable into account, it might also suggests that involvement and information to employees on firm objectives, customers, products, organization is a fast rout to have the employee care about their own and their colleagues factory lives in relation to safety and WC.

The second objective was to examine how employees´ general attitudes towards safety and work conditions related to their sustainable work behavior. As an integrate part of this question the Brown et al. (2000) model was revisited. Although most of the original hypotheses were reconfirmed, it was found that some were found to be insignificant. The relationship between Safety Hazards and Supervisory Safety Climate was contrary to the original result found to be of a positive nature. This means that more perceived safety hazards leads to higher perceptions of the supervisory safety climate. One possible explanation for this result is that the difference between cultures in this sample versus the original sample plays a part. This however needs to be explored further before a conclusion can be made. Another finding is that employees´ general attitudes towards safety and WC predict somewhat their sustainable work behavior. Another finding is that it was possible to construct a model and some variables for WC behavior that had similar predictions as the ones for safety. This highlights how the two aspects of work life are highly connected. For practitioners these results are important because the predictions made in the old and the extended model predicts how employees may be influenced to work in a more sustainable way. Further the intimate connection found between employees´ safety behavior and WC behavior provides opportunity for factory managers to connect them in their practices settings. If management can heighten employee morale and attitudes on WC, they might already have influenced to a great extend the willingness of their workers to abide on safety.

Contributions

This study contributes to existing behavioral research in OM on safety and WC issues in at least five different ways:

- A new extended definition and framework of sustainable work behavior is provided.
- It demonstrates that all relationships in the Brown et al. (2000) model are not necessarily robust in any factory or cultural environment.
- It provides new insights into how a multitude of employee characteristics may influence safety and WC behavior in factories.
- It defines two new measures on "general attitudes towards safety and WC" and highlights their potential power to predict sustainable work behavior.
- It defines "WC efficacy" and "Cavalier attitudes towards WC" as two new variables, and demonstrates how these variables are similar to aldrady defined variables on workplace safety.

Limitations and suggestions for further research

Like any other study this study has limitations. First, due to issues of fear or pressure from their supervisors there may be a bias inherent in having Chinese employees fill out

questionnaire in their workplace. Second, although we now have moved the Brown et al. (2000) model to a different empirical setting, we can still not generalize our findings.

In relation to future research there is a need for more studies exploring workers influence on the implementation of sustainability in the supply chain. This research has taken a first step. Specifically it propose “sustainable work behavior”, as defined in this paper, as a new central construct in our continued exploration of the link between central outcomes in OM. Another suggestion following from the results is a call for a much closer links and co-operations between safety, WC, and behavioral OM-research. Finally it seems that the inclusion of culture as a central construct in future research in their area is needed.

References

Abbasi, M. & Nilsson, F. (2012), “Themes and challenges in making supply chains environmentally sustainable", *Supply Chain Management*, Vol. 17, No. 5, pp. 517-530.

Ansari, A. & Modarress, B. (1997), "World-class strategies for safety: a Boeing approach", *International Journal of Operations & Production Management*, vol. 17, no. 3, pp. 389-398.

Brown, K.A. (1996), "Workplace safety: A call for research", *Journal of Operations Management*, vol. 14, no. 2, pp. 157-171.

Brown, K.A., Willis, P.O. & Prussia, G.E. (2000), "Predicting safe employee behavior in the steel industry: development and test of a sociotechnical model", *Journal of Operations Management*, vol. 18, no. 4, pp. 445–465.

Cheyne, A, Cox, S., Oliver, S. and Tomas J.M. (1998), “Modelling safety climate in the prediction of level of safety activity”, *Work Stress*, Vol. 12, pp. 255-271.

Cronbach, L.J. (1951), “Coefficient alpha and the internal structure of tests”, *Psychometrika*, Vol. 16, pp. 297-334.

Das, A., Pagell, M., Behm, M. & Veltri, A. (2008), "Toward a theory of the linkages between safety and quality", *Journal of Operations Management*, vol. 26, no. 4, pp. 521-535.

de Koster, R.B.M., Stam, D. & Balk, B.M. (2011), "Accidents happen: The influence of safety-specific transformational leadership, safety consciousness, and hazard reducing systems on warehouse accidents", *Journal of Operations Management*, vol. 29, no. 7, pp. 753-765.

Dunbar, R.L. (1975), "Managers' influence on subordinate thinking about safety", *Academy of Management Journal*, vol. 18.

Forza, C. (2002), "Survey research in operations management: a process-based perspective", *International Journal of Operations & Production Management*, vol. 22, no. 2, pp. 152.

Griffin, M.A. & Neal, A. (2000), "Perceptions of safety at work: a framework for linking safety climate to safety performance, knowledge, and motivation", *Journal of occupational health psychology*, vol. 5.

Maslow, A.H. (1943), “A theory of human motivation”, *Psychological Review*,Vol.50, No.4, pp.370–396.

McFadden K.L., Henagan S.C. & Gowen C.R. (2009), "The patient safety chain: transformational leadership's effect on patient safety culture, initiatives, and outcomes", *Journal of Operations Management*, vol. 27, pp. 390-404.

McFadden, K.L. & Hosmane, B.S. (2001), "Operations safety: an assessment of a commercial aviation safety program", *Journal of Operations Management*, vol. 19, no. 3, pp. 579-591.

Nunnally, J.C. (1978), *Psychometric Theory*, McGraw Hill, New York, NY.

Pagell, M. & Gobeli, D. (2009), "How plant managers' experiences and attitudes toward sustainability relate to operational performance",*Production and Operations Management*, vol.18, no.3, pp.278-299.

Prussia, G.E., Brown, K.A. & Willis, P.G. (2003), "Mental models of safety: do managers and employees see eye to eye?", *Journal of Safety Research*, vol. 34, pp. 143-156.

Quartey, H. S. & Puplampu, B. (2012), "Employee Health and Safety Practices: An Exploratory and Comparative Study of the Shipping and Manufacturing Industries in Ghana", *International Journal of Business & Management*, vol. 7, no. 23, pp. 81-95.

Trist, E. and Bamforth, K. (1951), “Some social and psychological consequences of the longwall method of coal getting”, *Human Relations*, 4, pp.3-38.

Tucker, A.L. (2004), "The impact of operational failures on hospital nurses and their patients", *Journal of Operations Management*, vol. 22, pp. 151-169.

Wolf, F.G. (2001), "Operationalizing and testing normal accidents theory in petrochemical plants and refineries", *Production and Operations Management*, vol. 10, no. 3.

Zohar, D. (2010), "Thirty years of safety climate research: Reflections and future directions", *Accident Analysis & Prevention*, vol. 42, no. 5, pp. 1517-1522.